No. 805,901. PATENTED NOV. 28, 1905.

H. T. CEDERGREN.

TELEPHONE EXCHANGE SYSTEM.

APPLICATION FILED JAN. 28, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

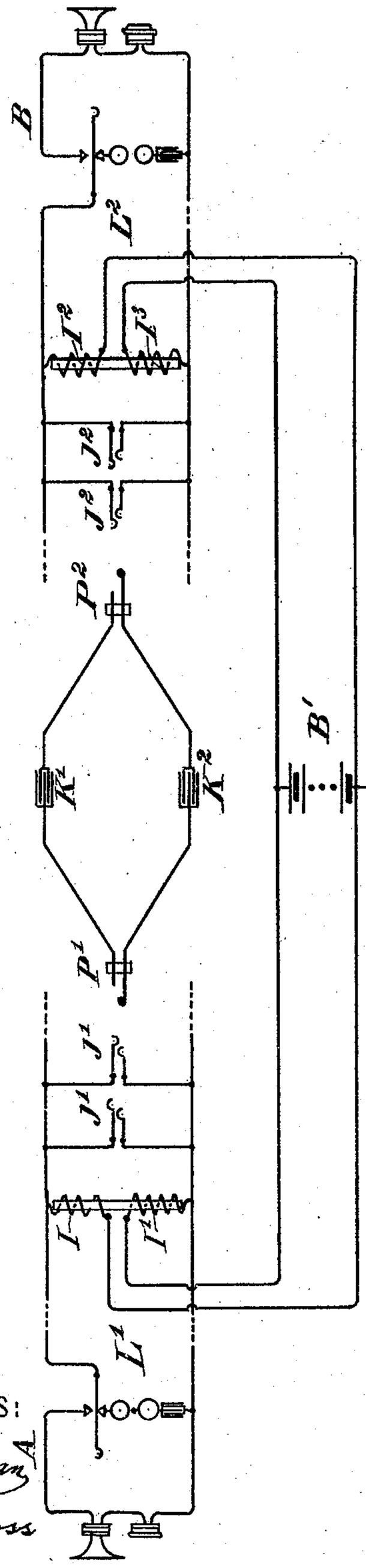
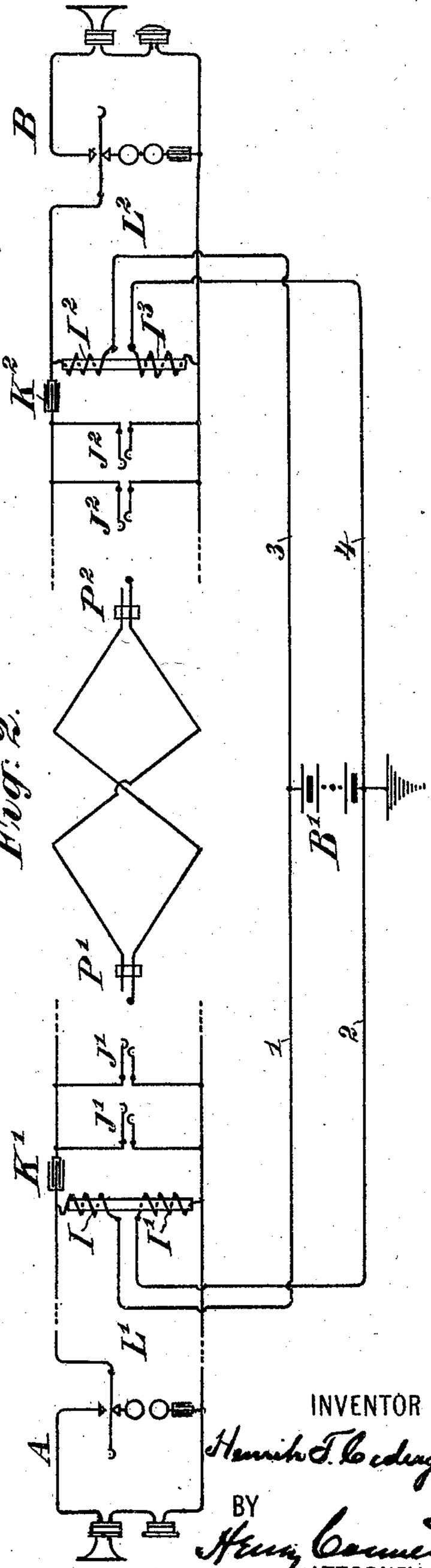


Fig. 2.



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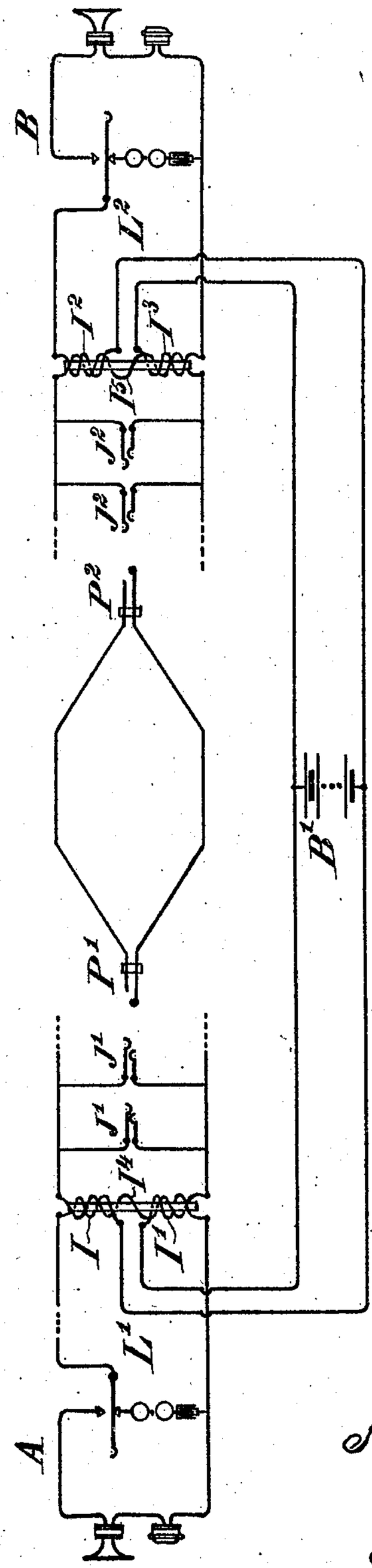
2 SHEETS—SHEET 2.

Fig. 3.



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TELEPHONE-EXCHANGE SYSTEM.

No. 805,901. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed January 28, 1902. Serial No. 91,575.

To all whom it may concern:

Be it known that I, HENRIK THORE CEDERGREN, a subject of the King of Sweden and Norway, and a resident of Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Telephone-Exchange Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to telephone-exchange systems with a central battery supplying current to the transmitting-telephones at the substations, and particularly to that class of these systems having inductive resistances interposed at the central station between each line conductor and the central battery.

The characteristic feature of the invention consists in that the said inductive resistances are so located, and the spring-jacks and each pair of cords, for electrically uniting or looping together different lines, arranged in such a manner that the continuous current from the central battery does not find any closed circuit through any part of the jack-field.

In carrying out my invention I place the inductive resistances in front of all jacks appertaining to the respective lines and provide the line on the other side of the inductive resistances with a break for the continuous battery-current.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a diagrammatic view of the construction, and Figs. 2 and 3 are similar diagrammatic views illustrating other forms thereof which will be hereinafter described.

In the form of carrying out my invention shown in Fig. 1, A and B denote two substations arranged in the manner common in central-battery systems—*i. e.*, when the telephone is hung upon its switch-hook the signal-bell and a condenser are connected with the line-circuit; but when during conversation the telephone is removed from its hook the telephone receiver and transmitter are connected in series with the line-circuit. From the substations the lines $L' L^2$ lead to the central station. The inductive resistances I I′ and $I^2 I^3$, respectively, are connected at one end with the line conductors and at the other end with the battery B′. Placed behind the resistances are spring-jacks $J' J^2$. $P' P^2$ represent a pair of plugs in the cord-circuit of which the respective condensers K′ and K^2 are placed in the manner shown in the drawing. As soon as a receiving-telephone is removed from its switch-hook a circuit is closed from the battery B′ through the respective inductive resistances, line, switch-hook, telephone receiver and transmitter. At the other side of the inductive resistances there is no closed circuit for the battery B′, as even when two lines are connected together by a pair of cords the condensers inserted in the said cords prevent the passage of continuous current from the battery.

As shown in Fig. 1, the spring-jacks are permanently connected to the poles of the battery B′ through the inductive resistances. This may under some circumstances be an inconvenience. If there arises any fault in the field of the spring-jacks—for instance, if the line-contacts come in contact with each other—the battery will be closed through the jack-field. If, further, one pole of the battery is connected with the earth, as is usually the case, a battery-circuit will also be closed if a jack-line is put in communication with the earth. This inconvenience is, however, overcome by arranging the system as shown in Fig. 2. According to this arrangement the condensers $K' K^2$ have been placed between the inductive resistances and the respective spring-jacks in such a manner that each line contains one condenser. One pole of the battery is connected with the earth. The other pole is connected through the inductive resistances $I I^2$ with the line conductors, including the condensers. One pole of the battery being connected with the earth, the conductors 2 4 and adjoined parts have no electric tension, and only the conductors 1 3 and adjoined parts are supplied with such tension. The condensers being interposed, however, in the line conductors in front of the spring-jacks and supplied with tension, the latter are not supplied with electric tension from the battery B′. As shown in the figure, the strands of the cords are crossed. Although, therefore, only one condenser is interposed in each double line, nevertheless two double lines connected together for conversation always include one condenser in each branch.

A still more effective manner of keeping the line-contacts of the spring-jacks and the part of the operator's set connected thereto free from electric tension is illustrated in Fig. 3. The inductive resistances are here connected only to the outer side of the line. The part of the line leading to the spring-

jacks is connected to a coil I^4 or I^5 of the inductive resistances in such a manner that these resistances will, in fact, form transformers for the voice-currents or for the signaling-currents passing through the lines. By this arrangement the spring-jacks will, however, have no connection at all with the battery B'.

In Figs. 1 and 2 the devices serving to prevent the passing of continuous currents from the battery but allowing the passing of alternating currents have been shown as condensers. It is, however, obvious that any suitable device serving the said purpose can be employed.

Though in the drawings inductive resistances are shown interposed between each pole of the central battery and all the lines, so that two inductive resistances are used for each line, it is obvious to persons skilled in the art that one inductive resistance is sufficient for each line, said resistance being interposed between one pole of the central battery and one branch of the line.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A telephone-exchange system of the type specified, having a central battery, conductors which connect the poles of said battery respectively with the two branches of the line conductors, the connecting-points of the said conductors with said branches being situated between the respective spring-jacks of the line's corresponding substations, inductive resistances interposed between the central battery and the line conductors, plug conductors to unite the spring-jacks of different subscribers, and means for preventing the central-battery current from flowing at any time through any part of the jack-field and cord conductors, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRIK THORE CEDERGREN.

Witnesses:

GOTTLIEB PILTZ,

K. FR. WINCRANTZ.